

Bibliometric Analysis of Economics & Business Based on InCites

-Taking HUST as an Example

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Abstract—This paper analyzes the characteristics and shortcomings of Economics & Business in Huazhong University of Science and Technology (HUST), and provides references for its construction and development. This paper regards discipline data of Economics & Business based on InCites as the research object, selects Tsinghua University, Shanghai Jiaotong University, Zhejiang University, Xi'an Jiaotong University and Wuhan University as the benchmarking institutions, adopts the method of literature metrology to analyze HUST from several aspects, including the quantity of papers, citation frequency, research theme, and journals. The school has insufficient papers, and big difference in the quantity and percentage of international cooperation papers. Economics & Business is still a weak discipline. It requests us to arrange disciplines and reinforce the strength of input and support; increase the output of papers; reinforce international cooperation and exchange; pay more attention to international hotspots in research contents; promote interdisciplinary and integration and drive weak disciplines to develop with preponderant disciplines.

Keywords—Economics & Business; Bibliometrics; InCites

I. INTRODUCTION

InCites database [1] is the bibliometric analysis evaluation tool released by Clarivate Analytics, and is commonly used to measure the scientific research performance of institutions, and follow the trend of scientific development. ESI database [2] analyzes and evaluates papers, journals, institutions, etc. from a global perspective in 22 discipline fields, InCites provides basic paper data and measurement index, ESI and InCites index data are combined for analysis, and can provide in-depth thinking and effective countermeasures for discipline construction [3].

This paper selects colleges with outstanding performance in science & engineering or the same region, including Tsinghua University (THU), Shanghai Jiaotong University (SJTU), Zhejiang University (ZJU), Xi'an Jiaotong University (XJTU) and Wuhan University (WHU) as the benchmarking institutions, compares from literature metrology perspective, analyzes the characteristics and disadvantages of Huazhong University of Science and Technology (HUST), to provide references for the construction and development of Economics & Business.

II. DATA AND METHODS

A. Data Source

Seize institutional index data of "Economics & Business" under the discipline classification of Essential Science Indicators under InCites database, and select Article and Review as the type of references. ESI data in March, 2019 can cover the range from January 1, 2008 to December 31, 2018, i.e., the data of 11 years. In order to ensure that InCites index data can be as close as possible to ESI, we will set the time range as 2008-2018.

As for the exported index data, sort out and make statistics via Excel, and process partial data with InCites database directly. The time of data retrieval is April 25, 2019.

B. Bibliometrics Measurement Index and Research Methods

Tsinghua University, SJTU, ZJU, XJTU and WHU are selected as benchmarking institutions, compare and analyze the difference in the quantity of papers, citation frequency and other indexes, and summarize the development characteristics of HUST in Economics & Business.

Bibliometric index and the significance: ① Doc, number of web of science documents, in this article only article and review are discussed; ② Cites, number of times the set of publications has been cited; ③ CNCI (Category Normalized Citation Impact), Citation impact normalized for subject, year and document type; ④ HCP (Highly cited papers), Papers that rank in the top 1% by citations for field and year; ⑤ % Doc in Top 10%, Percentage of publications in the top 10% based on citations by category, year, and document type; ⑥ Inter collaborat (International collaborations), papers that contain one or more international co-author; ⑦ % Inter collaborat (% International collaborations), percentage of publications that have international co-authors.

III. RESULTS AND DISCUSSION

A. General Conditions

In this ESI ranking data, a total of 342 institutions of Economics & Business were enrolled in the list, including 6 institutions from the mainland of China. Among six universities analyzed in the paper, only THU, SJTU and XJTU entered global top 1%, while ZJU, HUST and WHU failed to be enrolled in the list. Refer to Table 1 for ESI ranking, the quantity of papers and other indexes.

THU ranked the top in ESI, and also had the highest quantity and percentage of papers, citation frequency and international cooperation papers, and above 57% papers were from international cooperation. SJTU has the highest CNCI, cited papers, and the percentage of papers ranking top 10% of citation, and the percentage of international cooperation papers ranked the second, and above 55% papers were from international cooperations.

XJTU ranked the 299th in ESI, and its CNCI was only second to SJTU. ZJU failed to enter top 1% of this ESI, but

showed certain advantages in the quantity of papers and the percentage of cited papers and international cooperation papers, etc. The quantity of papers was the lowest in HUST, but it showed certain advantages in CNCI and the percentage of papers ranking top 10% of citation, and the later one ranks only second to SJTU, but the quantity and percentage of international cooperation papers were lower than WHU.

When being compared with THU, ZJU and SJTU, the quantity of papers showed obvious decrease in HUST and WHU.

TABLE I OVERALL CONDITIONS ABOUT ECONOMICS& BUSINESS IN SIX SCHOOLS

Inst	ESI	Doc	Cites	CNCI	HCP	% Doc in Top 10%	Inter Collaborat	% Inter Collaborat
THU	179	869	9554	1.18	9	11.97	498	57.31
SJTU	276	666	6259	1.43	17	14.11	369	55.41
XJTU	299	464	5809	1.27	5	11.64	202	43.53
ZJU	N/A	668	4924	1.02	10	9.13	366	54.79
HUST	N/A	323	2352	1.23	5	12.07	119	36.84
WHU	N/A	361	2123	1.00	3	8.31	161	44.60

B. Analysis on the Output of Papers over the Years

From 2008 to 2018, the output of papers in six schools showed a trend of increase as a whole, with ups and downs in certain year. See Figure 1.

THU had the biggest advantages in the quantity of papers, and showed a stable increase, but slight drop in 2013 and an obvious increase in 2017. From 2008 to 2015, papers were annually increased in SJTU, especially after 2013, but it was dropped for two successive years in 2016 and 2017

respectively, then showed a big increase in 2018. XJTU had no outstanding advantages in papers and showed big drops in 2015. However, ZJU had more advantages in the quantity of papers, and increased fast for two successive years in 2011 and 2012. The trend of increase was especially outstanding in 2018, which was above 50%. From 2008 to 2014, the papers increased slowly in HUST, which was far less than WHU; The trend of increase was bigger in 2015 and 2017, and the quantity of papers in 2017 was more than that in WHU.

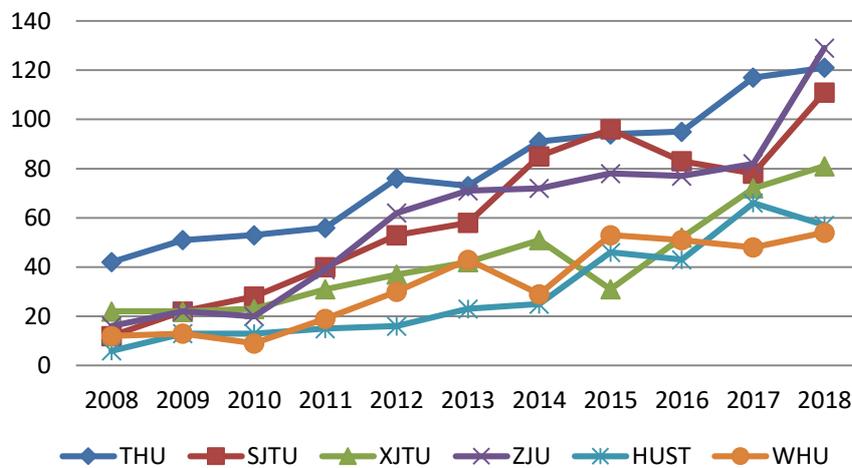


Fig. 1 Changes in the Output of Papers from 2008 to 2018

C. Analysis on Periodical Distribution

Among six schools, papers of THU covered the highest type of journals, which was 259 types, while that for SJTU and ZJU also exceeded 200 types, which were 221 and 211 types, and that for XJTU and WHU was 160 and 149 types respectively, and that for HUST was 135 types, which was the least.

Refer to Table 2 for the Journals Ranking Top 5 of the Publishing Quantity in Six Schools. China Economic Review was the journal with the highest publishing quantity in THU and ZJU, which was respectively 39 and 26; XJTU and SJTU published 11 and 9 papers respectively in the journal, while WHU and HUST published 5 and 4 papers respectively. This journal is also the only journal with above 30 published papers, and THU is also the only university that has published above 30 papers in the same type of journal.

SJTU, HUST, XJTU, ZJU and WHU published above 10 papers in Journal of Business Ethics, of which SJTU published

above 21 papers. ZJU published 9 papers, while THU only published 1 paper.

TABLE II ANALYSIS ON PAPERS AND JOURNALS OF ECONOMICS& BUSINESS IN SIX SCHOOLS

Inst	Analysis on Journals	
THU	259	China Economic Review(39),Insurance Mathematics & Economics(26),International Journal Of Technology Management(21),Journal Of Econometrics(21),Emerging Markets Finance And Trade(17),Energy Economics(17),Journal Of Comparative Economics(17)
SJTU	221	Applied Economics Letters(23),Journal Of Business Ethics(21),Economic Modelling(19),Economics Letters(18),Journal Of Business Research(15)
XJTU	160	Asia Pacific Journal Of Management(25),IEEE Transactions On Engineering Management(19),Chinese Management Studies(18),Journal Of Business Research(18),Applied Economics(14)
ZJU	211	China Economic Review(26),Economic Modelling(23),China Agricultural Economic Review(17),Asian Journal Of Technology Innovation(16),Chinese Management Studies(16),Emerging Markets Finance And Trade(15)
HUST	135	Journal Of Business Ethics(12),Management Decision(12),Applied Economics Letters(11),Economic Modelling(10),Emerging Markets Finance And Trade(10)
WHU	149	Annals Of Economics And Finance(23),Romanian Journal Of Economic Forecasting(19),Journal Of Business Research(14),Applied Economics Letters(13),Economic Modelling(12),Journal Of Business Ethics(11)

D. Analysis on Research Topics

Papers of Economics& Business covered many research themes in six schools. Papers of THU and ZJU covered the most research themes, which were 43 each, while that for SJTU, XJTU, HUST was 40, 34 and 35 respectively, and that for WHU was the least, which was 32. Refer to Table 3.

The most popular theme of papers was Economics in THU, ZJU, SJTU and WHU, and the quantity of papers under the theme reached up to 530 in THU, while that for ZJU and SJTU also exceeded 300 papers, which was 383 and 308 respectively.

The quantity of papers under such theme also exceeded 100 in XJTU and HUST, which was 130 and 110 respectively, and the quantity of papers ranked the 3rd.

Themes ranking top 4 in the quantity of papers were consistent in five schools, including: Economics, Management, Business, Finance and Business Themes of papers ranking top 5 in the quantity of papers were Operations Research & Management Science in SJTU, XJTU and HUST.

TABLE III RESEARCH THEME ON THE PAPERS RELATED TO ECONOMICS& BUSINESS IN SIX SCHOOLS

Inst	Research Areas	
THU	43	Economics(530); Management(225); Business, Finance(165); Business(127); Social Sciences, Mathematical Methods(77).
SJTU	40	Economics(308); Management(231); Business(147); Business, Finance(139); Operations Research & Management Science(40).
XJTU	34	Management(232); Business(160); Economics(130); Business, Finance(60); Operations Research & Management Science(26).
ZJU	43	Economics(383); Management(182); Business(132); Business, Finance(85); Agricultural Economics & Policy(34).
HUST	35	Management (124); Business (117); Economics (110); Business, Finance(29); Operations Research & Management Science (24).
WHU	32	Economics(205); Business(110); Management(79); Business, Finance(35); Mathematics, Interdisciplinary Applications(28).

Figure 2 has revealed the performance of top 20 research themes related to Economics& Business in HUST Business

related papers were the most, and the citation frequency ranked the second, while CNCI was higher than the global average

level, but was lower than the average level of institutional papers; The citation frequency was the highest for papers related to Management, and the quantity of papers ranked the second, CNCI value was 1.97, which was about 2 times of global average level, and was higher than the average level of institutional papers.

1 paper related to Information Science & Library Science was cited for 30 times, and CNCI reached to 4.45. 2 papers related to Computer Science and Software Engineering were cited for 66 times, and CNCI reached to 3.5.

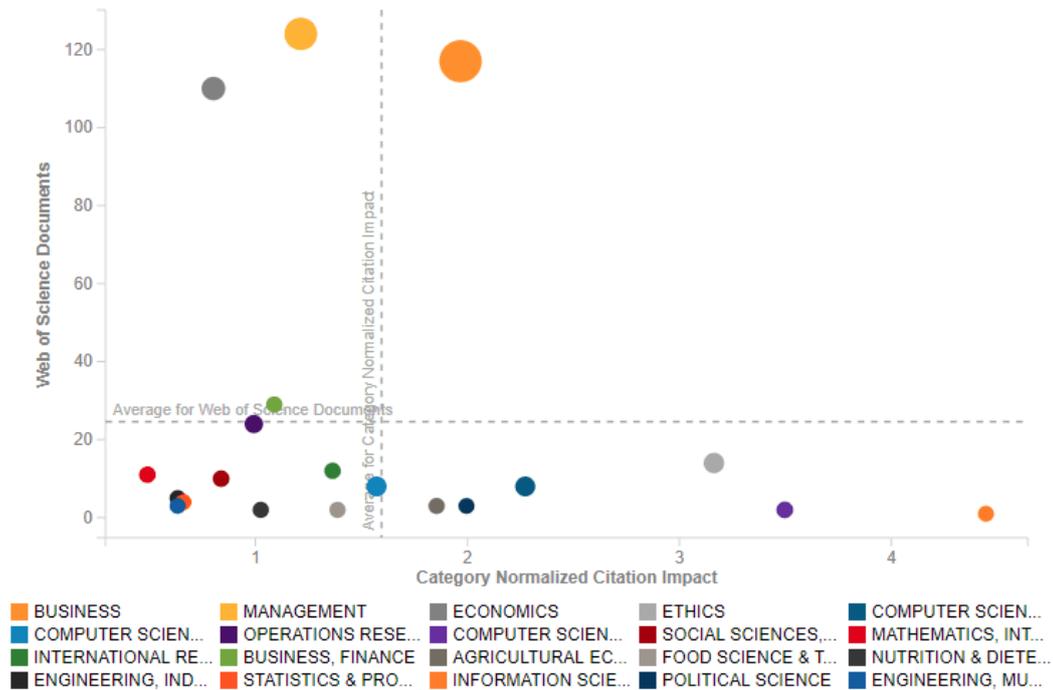


Fig. 2 Analysis on the Performance of HUST Research Theme

E. Analysis on HUST Scientific Research Cooperative Performance

By analyzing papers of Economics& Business in HUST, we found out that it had concluded scientific research cooperation with 198 institutions, 122 international institutions and 76 domestic institutions. Wherein, the cooperation was closer with Georgia State Univ, City Univ Hong Kong and Wuhan Univ, etc. and had generated a better influence. 25 papers cooperated with Georgia State Univ were cited for 312 times; 23 papers cooperated with City Univ Hong Kong were

cited for 225 times; 20 papers cooperated with Wuhan Univ were cited for 159 times.

The quantity of papers published in cooperation with Providence Univ-Taiwan, Univ Cologne, Minjiang Univ, etc. was low, and only limited to one paper, but CNCI was high.

TABLE IV ANALYSIS ON HUST SCIENTIFIC RESEARCH COOPERATIVE PERFORMANCE

By Cites(cites)	By Doc(papers)	By CNCI(papers, Doc/CNCI)
Georgia State Univ(312)	Georgia State Univ(25)	Providence Univ-Taiwan(1, 11.62)
Univ Texas Rio Grande Valley (223)	City Univ Hong Kong(23)	Univ Cologne(1, 11.02)
City Univ Hong Kong(225)	Wuhan Univ(20)	Minjiang Univ(1, 9.32)
Indian School of Business(166)	Hong Kong Baptist Univ(16)	San Diego State Univ(1, 8.39)
Wuhan Univ(159)	Zhongnan Univ Economics & Law(16)	Worcester Polytechnic Inst(1, 8.21)

F. Analysis on HUST Department Contribution

From 2008 to 2018, 10 departments of HUST published papers of Economics& Business (Note: 48 papers had no clear marks of affiliated department, and no relevant contents were listed in Table 5). Wherein, the School of Management

published the most papers, reached to 176 papers, and exceeded 50% of the total volume; The School of Economics and School of Automation respectively published 70 and 11 papers, and occupied 21% and 14% respectively. The School

of Public Affairs and the School of Medicine and Health Care Management had 9 and 7 papers respectively, and both of the quantity exceeded 2%.

As for the citation, the biggest contribution was made by the School of Management, 176 papers were generated and then cited for 1,469 times, i.e., 52.85% contributed papers were cited by 61.72%. The quantity of citation for papers in

the School of Economics reached to 161 times, so the percentage of citation was relatively low, and was only 6.76%, when being compared with 21% percentage of papers. The percentage of citations exceeded 1% in the School of Automation, the School of Public Affairs, and the School of Medicine and Health Care Management, which was respectively cited for 77, 58 and 27 times.

TABLE V ANALYSIS ON THE PAPER CONTRIBUTION OF DEPARTMENTS IN HUST ECONOMICS& BUSINESS

NO.	Sch	Doc		Cites	
		Doc	Percent	Cites	Percent
1	Sch Management	176	52.85%	1469	61.72%
2	Sch Economics	70	21.02%	161	6.76%
3	Sch Automation	11	3.30%	77	3.24%
4	Sch Public Administration	9	2.70%	58	2.44%
5	Sch Med & Hlth Management	7	2.10%	27	1.13%
6	Sch Math & Statistics	4	1.20%	15	0.63%
7	Sch Mech Sci & Eng	3	0.90%	1	0.04%
8	Sch Civil Eng & Mechanics	3	0.90%	15	0.63%
9	Sch Comp Sci & Technol	1	0.30%	2	0.08%
10	WNLO	1	0.30%	2	0.08%

IV. CONCLUSION AND SUGGESTION

A. Focus on the Development of Economics and Business

In 2015, Xiaoyang ZHANG studied advantageous disciplines of universities in the mainland of China based on 9 issues of ESI data. From September 2013 to January 2015, only one of the universities in the mainland of China ranked global top 1% of ESI, and held that Economics& Business and other disciplines were still in a low ranking position internationally[4]. In 2018, Min LIU investigated ESI discipline in 26 normal universities, and found out that no normal universities can rank global top 1% in Economics& Business[5].

In general, ESI Economics& Business is the weak discipline of mainland colleges, with less quantity of colleges ranking global top 1% in Economics& Business and low ranking position. Therefore, colleges should be engaged in disciplinary construction and development layout, enlarge input and support strength, and lay a foundation for balanced development of disciplines.

B. Increase the Output of Scientific Research Papers

Papers are important forms of scientific research achievements, so the quantity of papers is often used to evaluate the scientific research output capacity of institutions[6]. We can see from the comparative analysis mentioned above that, although the output of papers in six schools showed a stable trend of increase over the past 11 years, obvious drop was shown in each school. This indicates that the scientific research output capacity of the discipline is unstable, without powerful development.

Wherein, HUST had the fewest papers, and showed a stable trend of increase from 2008 to 2014, but a bigger trend of increase in 2015 and a drop in 2016. When being compared with the other five schools, it still had big gaps with the quantity of papers in HUST. The output of papers in the field increased fast in ZJU, with obvious advantages, and the total quantity of papers had exceeded that in XJTU. Therefore, HUST should pay enough attention to Economics& Business, enlarge the output of papers in the field, and especially focus on publishing more high-level papers.

C. Reinforce International Exchange and Cooperation.

In six schools, HUST has the lowest quantity and percentage of international cooperation papers. We can find out by further analysis that, HUST has been equipped with better international cooperation foundation, cooperated with many international institutions and generated good influence. More papers were cooperated with Georgia State Univ and City Univ Hong Kong, and had generated high citation frequency. Besides, there were few papers cooperating with Univ Cologne and San Diego State Univ, but the influence was higher.

As for the analysis from the perspective of journals, the journal with the most published papers in six schools is China Economic Review, followed by Chinese Management Studies, indicating that scholars tend to publish on domestic journals, and all academic achievements are mostly based on actual conditions in China, with low degree of internationalization.

Shanshan WAN found out by researches that, Harvard University has the strongest scientific research strength in Economics& Business, followed by Princeton University,

University of Pennsylvania, Stanford University, Massachusetts Institute of Technology, etc.[7]. In the future, it is requested to take active measures to carry out close cooperation and exchange with such schools, drive the further development of disciplines, and generate more and better academic achievements.

D. Further Expand the Scope of Disciplinary Research

Through analyzing the research theme, and comparing THU, ZJU, SJTU, etc., we can find out that the research scope of Economics& Business in HUST is relatively narrow, but it is still of certain advantages in comparison with XJTU and WHU. Papers of the school involved 35 research themes, THU and ZJU involved 43 themes, while, SJTU, XJTU and WHU respectively involved 40, 34 and 32 themes.

After analyzing the contents of research themes, six schools generated more papers in Economics& Management. This has verified that the prosperous development of Economics& Business in China is closely related to the fast development of Chinese economy. However, the research hotspots of International Economics& Business should focus on international trade, technical transmission, global economic increase, company systems, enterprise competitive advantages and performances, and global ecological environment[8]. Therefore, it is suggested that we should further expand the scope of research, gradually expand towards these research directions, and focus on developing potential projects with good prospect.

E. Promote Interdisciplinary and Integration

HUST has a total of 45 departments[9], and a total of 10 departments published papers of ESI Economics& Business over the past 11 years. Wherein, the School of Management made the most outstanding contributions, and both the quantity of papers and the citation frequency exceeded 50%, and ranked the first; The School of Economics also contributed more papers and citations; In science and engineering departments, the School of Automation, and the School of mathematics and statistics also published more papers.

Economics& Business is a discipline with stronger theoretical property and applicability, for instance, mathematics, statistics method and computer technologies should be applied in econometrics, and then the main approach is to build economic measurement model. Quantitative analysis research has random relationship between economic variables.

Schools should provide guidance to relevant researches about Economics& Business, encourage experts and scholars of mathematics, statistics and computer to take active participation, and provide technical support for the development of Economics& Business. By interdisciplinary and integration, advantageous disciplines can be used to drive weak disciplines to constantly develop and make progress, then promote the co-prosperity of disciplines.

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